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Paleomagnetic Data for Siberia and Baltica in the Context of Testing Some Geodynamic Models of the Formation of the Central Asian Mobile Belt

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Abstract—The synthesis of the paleomagnetic data for the Siberian (Siberia) and East European (Baltica) platforms shows that since the Early Paleozoic they could have experienced coherent movements as a part of consolidated continental agglomeration (a composite continent), which also includes the Arctida continent. Based on the paleomagnetic data, the relative positions of the Siberia and Baltica during the Ordovician is reconstructed, and a series of paleogeographical reconstructions describing the drift of the composite continent is suggested. The results of the lithologic–facial analysis of the sedimentation settings within the Ordovician basins of the Siberian and East European platforms and paleoclimatic markers are consistent with the suggested configuration and paleogeographical position of the composite continent. The suggested reconstructions and the ages of detrital zircons from the Early Paleozoic complexes of the platform margins and some objects of the Central Asian Mobile Belt (CAMB) reasonably well agree with the hypothesis (Sengör et al., 1993) which interprets the formation of the structure of CAMB Paleozoides as a result of the evolution of the island arc stretching along the margins of Siberia and Baltica.

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INTRODUCTION

The Central Asian Mobile Belt (CAMB) is the world's largest Paleozoic folded system assembling the Early Precambrian continental blocks—East European (Baltica) and Siberian (Siberia) cratons, Tarim, and smaller structural units—into a single continent of Northern Eurasia. The formation of CAMB is associated with the interaction between the lithosphere of the Paleo-Asian Ocean and continental masses during the Late Precambrian–Paleozoic. The CAMB has an extremely complicated internal structure in which the terranes with a different geodynamic nature and age are combined together, predominantly along the strike-slip faults (Shenger et al., 1994; Buslov, 2011; Metelkin, 2010; Sengör et al., etc.). The geodynamical models describing the CAMB formation can be classified into three groups according to their predominant concepts: accretion (Didenko et al., 1994), accretion–collision (Buslov et al., 2001; Buslov, 2011), and island–arc (Shenger et al., 1994; Sengör et al., 1993).

The supporters of the accretionary model interpret the CAMB-composing terranes as the relics of an island arc system of a different age, which developed within the Paleo-Asian Continent during the Vendian–Ordovician independently of the Laurasian cratons and were incepted on the continental crustal clocks split off from Gondwana. These island-arc complexes successively accreted to each other and were subsequently docked to the Siberian continent along the systems of strike-slip faults that inherited the ancient transform faults.

In the accretion–collision model, it is assumed that an active margin of the island-arc type existed in the Vendian–Early Cambrian on the southern Epi-Baikalian margin of the Siberian continent. The accretion–collision processes resulted in the formation of a superterrane in the frontal part of this active margin—the Kazakhstan–Baikal composite continent incorporating the Precambrian microcontinents and the Gondwana group terranes. The subsequent CAMB evolution is considered as the interaction of the Kazakhstan–Baikal continent (CAMB element) with Siberia and Baltica. A significant role in the formation of the structures in this process was presumably played by the Late Paleozoic movements along the sys-